

CHECKLIST TO DESIGNATE AREAS OF EVALUATION FOR REQUESTS FOR PROPOSAL (RFP)

MDOT PROJECT MANAGER Barbara H. Snyder			JOB NUMBER (JN) various	CONTROL SECTION (CS) various
DESCRIPTION IF NO JN/CS As Needed Survey Services for Bay Region				
MDOT PROJECT MANAGER: Check all items to be included in RFP. WHITE = REQUIRED GRAY SHADING = OPTIONAL			CONSULTANT: Provide only checked items below in proposal.	
Check the appropriate Tier in the box below				
<input type="checkbox"/> TIER I (\$25,000-\$99,999)	<input type="checkbox"/> TIER II (\$100,000-\$250,000)	<input checked="" type="checkbox"/> TIER III (>\$250,000)		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Understanding of Service	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Innovations</i>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Safety Program</i>	
N/A	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Organization Chart	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Qualifications of Team	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Past Performance	
Not required as part of official RFP	Not required as part of official RFP	<input type="checkbox"/>	Quality Assurance/Quality Control	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Location. The percentage of work performed in Michigan will be used on all contracts unless the contract is for on-site inspection, then location should be scored for the on-site inspection.	
N/A	N/A	<input type="checkbox"/>	Presentation	
N/A	N/A	<input type="checkbox"/>	Technical Proposal (if Presentation is required)	
3 pages including cover sheet (No Resumes)	7 pages	19 pages	Total maximum pages for RFP not including key personnel resumes	

REQUEST FOR PROPOSAL

The Michigan Department of Transportation (MDOT) is seeking professional services for the project contained in the attached scope of services.

If your firm is interested in providing services, please indicate your interest by submitting a Proposal, Proposal/Bid Sheet or Bid Sheet as indicated below. The documents must be submitted in accordance with the latest "Consultant/Vendor Selection Guidelines for Service Contracts" and "Guideline for Completing a Low Bid Sheet(s)", if a low bid is involved as part of the selection process. **Referenced Guidelines are available on MDOT's website under Doing Business > Requests for Proposals.**

RFP SPECIFIC INFORMATION

☒ BUREAU OF HIGHWAYS ☐ BUREAU OF TRANSPORTATION PLANNING ** ☐ OTHER

THE SERVICE WAS POSTED ON THE ANTICIPATED QUARTERLY REQUESTS FOR PROPOSALS

☒ NO ☐ YES DATED _____ THROUGH _____

<input checked="" type="checkbox"/> Prequalified Services – See page <u>4</u> of the attached Scope of Services for required Prequalification Classifications.	<input type="checkbox"/> Non-Prequalified Services - If selected, the vendor must make sure that current financial information, including labor rates, overhead computations, and financial statements, if overhead is not audited, is on file with MDOT's Office of Commission Audits. This information must be on file for the prime vendor and all sub vendors so that the contract will not be delayed.
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☒ **Qualifications Based Selection** – Use Consultant/Vendor Selection Guidelines

For all Qualifications Based Selections, the selection team will review the information submitted and will select the firm considered most qualified to perform the services based on the proposals. The selected vendor will be contacted to confirm capacity. Upon confirmation, that firm will be asked to prepare a priced proposal. Negotiations will be conducted with the firm selected.

**** For RFP's that originate in Bureau of Transportation Planning only**, a price proposal must be submitted at the same time as, but separate from, the proposal. Submit directly to the Contract Administrator/Selection Specialist, Bureau of Transportation Planning (**see address list, page 2**). The price proposal must be submitted in a sealed manila envelope, clearly marked in large red letters **"PRICE PROPOSAL – TO BE OPENED ONLY BY SELECTION SPECIALIST."** The vendor's name and return address **MUST** be on the front of the envelope. The price proposal will only be opened for the highest scoring proposal. Unopened price proposals will be returned to the unselected vendor(s). Failure to comply with this procedure may result in your bid being opened erroneously by the mail room.

For a cost plus fixed fee contract, the selected vendor must have a cost accounting system to support a cost plus fixed fee contract. This type of system has a job-order cost accounting system for the recording and accumulation of costs incurred under its contracts. Each project is assigned a job number so that costs may be segregated and accumulated in the vendor's job-order accounting system.

☐ **Qualifications Review / Low Bid** - Use Consultant/Vendor Selection Guidelines. See Bid Sheet Instructions for additional information.

For Qualification Review/Low Bid selections, the selection team will review the proposals submitted and post the date of the bid opening on the MDOT website. The notification will be posted at least two business days prior to the bid opening. Only bids from vendors that meet proposal requirements will be opened. The vendor with the lowest bid will be selected. The selected vendor may be contacted to confirm capacity.

☐ **Best Value** - Use Consultant/Vendor Selection Guidelines. See Bid Sheet Instructions below for additional information. The bid amount is a component of the total proposal score, not the determining factor of the selection.

☐ **Low Bid** (no qualifications review required - no proposal required.) See Bid Sheet Instructions below for additional instructions.

BID SHEET INSTRUCTIONS

A bid sheet(s) must be submitted in accordance with the "Guideline for Completing a Low Bid Sheet(s)" (available on MDOT's website). The Bid Sheet is located at the end of the Scope of Services. Submit bid sheet(s) separate from the proposal, to the address indicated below. The bid sheet(s) must be submitted in a sealed manila envelope, clearly marked in large red letters **"SEALED BID – TO BE OPENED ONLY BY SELECTION SPECIALIST."** The vendor's name and return address **MUST** be on the front of the envelope. Failure to comply with this procedure may result in your bid being opened erroneously by the mail room.

PROPOSAL SUBMITTAL INFORMATION

REQUIRED NUMBER OF COPIES FOR PROJECT MANAGER 4	PROPOSAL DUE DATE 2/21/07	TIME DUE 3:00 p.m.
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PROPOSAL AND BID SHEET MAILING ADDRESSES

Mail the multiple proposal bundle to the MDOT Project Manager or Other indicated below.

☒ MDOT Project Manager ☐ MDOT Other

Barbara H. Snyder, PS
55 E Morley Dr
Saginaw, MI 48601

Mail one additional stapled copy of the proposal to the Lansing Office indicated below.

Lansing Regular Mail	OR	Lansing Overnight Mail
<input checked="" type="checkbox"/> Secretary, Contract Services Div - B225 Michigan Department of Transportation PO Box 30050 Lansing, MI 48909		Secretary, Contract Services Div - B225 Michigan Department of Transportation 425 W. Ottawa Lansing, MI 48933
<input type="checkbox"/> Contract Administrator/Selection Specialist Bureau of Transportation Planning B340 Michigan Department of Transportation PO Box 30050 Lansing, MI 48909		Contract Administrator/Selection Specialist Bureau of Transportation Planning B340 Michigan Department of Transportation 425 W. Ottawa Lansing, MI 48933

GENERAL INFORMATION

Any questions relative to the scope of services must be submitted by e-mail to the MDOT Project Manager. Questions must be received by the Project Manager at least four (4) working days prior to the due date and time specified above. All questions and answers will be placed on the MDOT website as soon as possible after receipt of the questions, and at least three (3) days prior to the RFP due date deadline. The names of vendors submitting questions will not be disclosed.

MDOT is an equal opportunity employer and MDOT DBE firms are encouraged to apply. The participating DBE firm, as currently certified by MDOT's Office of Equal Opportunity, shall be listed in the Proposal

MDOT FORMS REQUIRED AS PART OF PROPOSAL SUBMISSION

- 5100D** – Request for Proposal Cover Sheet
- 5100G** – Certification of Availability of Key Personnel

(These forms are not included in the proposal maximum page count.)

Michigan Department of Transportation

SCOPE OF SERVICE FOR “As Needed” DESIGN SERVICES

CONTROL SECTION: Various

JOB NUMBER: Various

LOCATION: Various in the Bay Region

PREQUALIFICATION CLASSIFICATION:

Road Design Surveys	P/PMS Task 3330
Structure Surveys	P/PMS Task 3340
Hydraulic Surveys	P/PMS Task 3350
Right-of-Way Surveys	P/PMS Task 4510

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION: 0%

MDOT PROJECT MANAGER:

Barbara H. Snyder, PS
Michigan Department of Transportation
Bay Region
55 E. Morley Drive
Saginaw, MI 48601
1-989-754-0878
E-mail: snyderbarb@michigan.gov

Any questions regarding this Scope of Survey Services may be directed to the MDOT Project Manager:

GENERAL WORK DESCRIPTION:

The Consultant will be expected to provide experienced personnel for Design Survey services on an as needed basis for MDOT design projects. Such task would include but may not be limited to work in the following areas of survey: Road Design Survey, Structure Survey, Hydraulics Survey, and Right-of-way Survey.

Full time services will not be required on all projects at all times. This contract is for "as needed" services, based on the intermittent needs of the MDOT Bay Region Design Survey Unit. It must be noted that a consultant award under this contract is not a guarantee that MDOT will use the Consultant's services.

The MDOT Bay Region Land Surveyor will contact the Consultant for specific services through a Request for Consultant Survey Services (RCSS) Letter, Attachment A, stating the MDOT job number and control section, route, survey services needed, the project due date, and a description of the project. The consultant will then review this project and inform MDOT of their availability and willingness to work on this project, as well as the names of the consultant's personnel chosen to work on the project within two days of receiving the RCSS. An estimated cost will also be submitted to MDOT prior to the consultant beginning work. Every attempt will be made to submit requests at least one week prior to the need for personnel. If the Consultant accepts the MDOT work assignment, a meeting will be set up between MDOT and the Consultant to review the information in the RCSS and the Consultant's proposal and personnel. Please note that when a Consultant signs the RCSS letter it means that the Consultant accepts responsibility to perform under this As Needed Survey Services Scope and the RCSS letter requirements including the project due date.

The consultant will need to get approval of the Bay Region Surveyor prior to continuing work on an individual job which the consultant's billable costs exceeds 7% of the estimated cost of the project. If the Consultant does not get approval this over amount, the consultant will be working at their own risk.

MDOT reserves the right to grant final work authorization based on the consultant's understanding of the specific survey project tasks and personnel. If the consultant is unable to fulfill the request, MDOT may utilize a different Consultant awarded under this As Needed Scope for Consultant Survey Services.

There will be up to four (4) Consultant awards under this scope of services.

This contract will cover "as needed" services for a period of one (1) year from the date of initial Authorization. Each of the four (4) selected firms may receive an Authorization on a per project basis. The consultant may work on an "as needed" basis provided the consultant has performed adequately on the previous project. A consultant may not work on any more the one (1) "as needed" project at any given time, unless directed by the MDOT Bay Region Surveyor.

When describing the qualifications of the team, list only those individuals that will be available to work on any one (1) "as-needed" job. This team would be available to complete one (1) "as-needed" job in its entirety. The MDOT selection team will only score the qualifications for one (1) team. This team should consist of:

- 1 project manager
- 1 QA/QC individual
- 1 or 2 crew chiefs
- 1 CAiCE/CAD technician
- 1 or 2 survey assistants

This one (1) team and their roles/experience should be clearly stated in the proposal.

The team listed above should be used in developing the organization chart for the proposal.

Location will be scored by the selection team. Preference will be given to consultants that have offices within the Bay Region.

CONSULTANT PAYMENT

Compensation for this Scope of Design Survey Services shall be on actual cost plus fixed fee basis.

All invoices/bills for services must be directed to the Department and follow the 'then current' guidelines. The latest copy of the "Professional Engineering Service Reimbursement Guidelines for Bureau of Highways" is available on MDOT's Bulletin Board System, [invguide.pdf](#). This document contains instructions and forms that must be followed and used for invoicing/billing; payment may be delayed or decreased if the instructions are not followed. When submitting invoices for an "as needed" job for payment by the Department, the consultant will refer to the MDOT Job Number on the invoice.

Payment to the Consultant for Services rendered shall not exceed the "Cost Plus Fixed Fee Not to Exceed Maximum Amount" unless an increase is approved in accordance with the contract with the Consultant. All invoices/bills must be submitted within fourteen (14) calendar days of the last date of services for the "as needed" job being performed for that invoice. The Consultant shall not submit interim invoices for payment on any "as needed" project.

Direct expenses will not be paid in excess of that allowed by the Department for its own employees. Supporting documentation must be submitted, with the invoice/bill, for all billable expenses on the project. The only hours that will be considered allowable charges for this contract are those that are directly attributable to the surveying activities of this project. Hours spent in administrative, clerical, or accounting roles for billing and support, are not considered allowable hours; there will be no reimbursement for these hours.

This scope is for "as needed" services, as such, the hours provided are only an estimate. The Consultant will be reimbursed a proportionate share of the fixed fee based on the portion of these hours in which services have been provided to the Department. The fixed fee allowed for this project will be 11.0%.

There will be no reimbursement for overtime hours unless specified in advance in writing by the MDOT Bay Region Surveyor.

MONTHLY PROGRESS REPORT

On the first day of each month, the Consultant shall submit a monthly project progress report to the MDOT Project Manager. The monthly progress report shall address the following items:

1. Work accomplished during the previous month.
2. Anticipated work and goals for the coming month.
3. Real problems which occurred during the month, and anticipated problems for the coming month.

4. Any updates on the project schedule including explanations for any delays or changes in schedule, scope, or work plan.
5. An early review or submittals such as adjustments, computations, or alignment.

GENERAL REQUIREMENTS:

1. Surveys must comply with **all Michigan law** relative to land surveying.
2. Surveys must be done under the **direct supervision** of a Professional Surveyor licensed to practice in the State of Michigan.
3. Work in any of the following categories of survey: Road Design, Structure, Hydraulics, Right-of-Way, Ground Control (Photogrammetric), and/or Geodetic Control, must be completed by a survey firm which is pre-qualified by MDOT.
4. Surveys must meet all requirements of the Michigan Department of Transportation (MDOT) Design Surveys *Standards of Practice* dated March, 2006, unless superseded by this Scope of Work, and any additional requirements in the Survey Scope of Work. Please contact the Bay Region Surveyor to clarify any specific questions regarding these standards.
5. The Consultant is responsible for using the latest MDOT CAiCE Feature Codes, files and tugboats (macro), available on the MDOT File Transfer Protocol (FTP) site. **The CAiCE software used must be Version 10.2 or newer. The Consultant must also use MicroStation Version 8.**
6. Prior to performing the survey, the Consultant must contact all landowners upon whose lands they will enter. The contact may be personal, phone, or letter, but must be documented. This notice must include the reasons for the survey on private land, the approximate time the survey is to take place, the extent of the survey including potential brush cutting, and an MDOT contact person (the MDOT project manager).
7. Prior to surveying within the roadway, the Consultant must contact the MDOT Region and/or Transportation Service Center (TSC) Traffic and Safety Engineer about potential work restrictions regarding lane closures, work time limitations, proper safety devices and procedures.
8. The Consultant must adhere to all applicable OSHA and MIOSHA safety standards, including the appropriate traffic signs for the activities and conditions for this job.
9. The Consultant must contact any and all Railroads prior to commencing field survey on railroad property. The cost for any permits, flaggers and/or training that is required by the Railroad will be considered as a direct cost, but only if included in the Consultant's proposal.
10. Consultants are responsible for a comprehensive and conscientious research of all

records, including MDOT records, essential for the completion of this project.

11. Consultants must obtain all necessary permits, including an up-to-date permit from the MDOT Utilities Coordination and Permits Section, required to perform this survey on any public and/or private property.
12. Measurements, stationing, recorded data, and computations must be in INTERNATIONAL FEET.
13. The consultant must establish the primary horizontal coordinate control base to be used for the project. The horizontal coordinate control base must be a project ground system based upon the Michigan State Plane Coordinate System (NAD83 MSRN CORS96). A combined scale factor must be computed and applied, and a coordinate shift must be applied to differentiate the project ground coordinates from the grid coordinates. All horizontal measurements must be in the project ground coordinate system. The consultant must establish additional intermediate horizontal control points, as needed, to the control base. All intermediate control established in this survey, must be established in compliance with the Michigan Department of Transportation (MDOT) Design Surveys *Standards of Practice* dated March, 2006.
14. All elevations must be based upon the North American Vertical Datum of 1988 (NAVD88). Intermediate vertical control for this project shall be established by three wire, or digital differential leveling between two primary vertical control marks. All leveling work shall comply with the Michigan Department of Transportation (MDOT) Design Surveys *Standards of Practice* dated March, 2006.
15. Primary horizontal and vertical coordinate control must be held fixed, and additional intermediate control established in this survey must be adjusted by least squares methods to fit the coordinate base.
16. For a **Road Design Survey**, one complete hard copy portfolio and three complete sets of CDs or DVDs must be assembled and delivered in the format outlined on page 4 of the *Standards of Practice*, dated March 2006. For a **Structure Survey**, two complete sets must be submitted. As many portfolios should be used as needed to contain all of the required documents and compact discs (CDs).
17. Each portfolio must be labeled on the outside as follows, for example:

Survey Notes for:
Route, Location and Project Limits []
Control Section [] Job Number [] Date [of *submittal*]
By [*Name of Firm*]
Michigan Professional Surveyor [*name*] License #[xxxxxx]
18. Each submittal is to be divided into six sections. These sections are outlined in the *Standards of Practice*, dated March, 2006.

19. All data, whether electronic or paper, must be recorded on non-rewritable compact discs (CDs). All paper files, including MicroStation files, must be scanned and/or converted to Adobe Acrobat .PDF format. For the proper organization and contents of the CD, refer to the *Standards of Practice* dated March, 2006. CDs must be labeled with the route, location, control section, job number, Consultant name, and data type.
20. Each category of survey must be packaged separately (i.e. Structure survey separate from Road survey). All sheets in a portfolio must be marked with the control section, job number, portfolio section name and page number.
21. Text files containing the witness lists for the horizontal control points, alignment ties, government corners and bench marks must be generated in specific ASCII format as shown in Attachment ASC.
22. The Consultant representative must record and submit type-written minutes for all project related meetings to the MDOT Survey Consultant Coordinator within two weeks of the meeting. The Consultant must also distribute the minutes to all meeting attendees.
23. The MDOT Project Manager is the official contact for the Consultant. The Consultant must either address, or send a copy of all correspondence to the MDOT Project Manager. The MDOT Project Manager shall be made aware of all communications regarding this project. Any survey related questions, in regard to this project, should be directed to the MDOT Bay Region Surveyor.

At the completion of this survey, all field survey notes (legible copies will suffice), all electronic data, and all research records obtained for this project will be considered the property of MDOT and must be sent to MDO Bay Region Surveyor, 55 East Morley Drive, Saginaw, MI 48601. Please use MDOT's form 222(3/99) entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL" for all transmittals.

Acceptance of the survey by the MDOT Bay Region Surveyor does not in any way relieve the Consultant of any responsibility and liability for the content of the survey.

WORK RESTRICTIONS

The Consultant must notify the closest Transportation Service Center (TSC) Traffic and Safety Engineer and/or the prior to beginning surveying activity in the area, and to obtain any additional potential work restrictions. The Consultant is advised to discuss Traffic Control Scenarios with the Traffic and Safety Engineer prior to submitting a PRICED proposal.

The Consultant must notify the MDOT Region and the closest Transportation Service Center (TSC) Traffic and Safety Engineer prior to submitting a priced proposal and prior to beginning surveying activity in the area, and to obtain any potential work restrictions.

The MDOT TSC Traffic & Safety Engineer must be notified at least two weeks prior to lane closures so advance notice can be posted on the Web Site.

No work shall be performed or lane closures allowed during holiday periods. Check with the Survey Project Manager for work-restricted times.

Traffic must be maintained by the Consultant throughout the project in accordance with Sections 812, 922, 103.05 and 103.06 of the *Standard Specifications for Construction*, 2003 edition, www.mdot.state.mi.us/specbook/ , and Supplemental Specification 03SS001(2) Errata to the 2003 Standard Specification and all other supplemental specifications currently in effect against the *Standard Specification for Construction*. All traffic control devices shall conform to the current edition, as revised, of the *Michigan Manual of Uniform Control Devices* (MMUTCD). All warning signs for maintenance of traffic used on this project shall be fabricated with prismatic retro-reflective sheeting.

The Consultant must use MDOT standard "maintaining traffic" typicals for any and all closures. Typical MDOT traffic control diagrams are available on line at www.mdot.state.mi.us/tands/plans.cfm .

FIELD SURVEY

The purpose of the field survey is to obtain information and/or data required by/for a project design engineer, to provide a survey basis for the preparation of legal descriptions and documents to acquire rights of way, easements, and permits, to leave horizontal and vertical control in the field for future construction staking, and to provide a sufficient history of the area to enable the MDOT Design Survey Unit to perform, in the future, dependable surveys.

The field survey must include, but is not limited to, the following: Each area below will be discussed for each job. The Consultant will know the scope for each "as needed" project.

CONTROL

The methods used to establish the horizontal and vertical components of the project coordinate control system must be fully discussed in the Surveyor's Project Report.

A three dimensional coordinate system needs to be established for this project in **International Feet**.

The horizontal component of this coordinate system must be based on the Michigan Coordinate System of 1983 (MCS 83), in the appropriate zone. The horizontal control system must be based on existing NGS control and/or the Michigan CORS stations. The horizontal least squares adjustment must be reported at the 95% confidence level.

Upon request, the MDOT Design Survey Unit will supply descriptions of nearby published National Geodetic Survey (NGS) control stations and benchmarks. A complete history and recovery description with new witnesses, in DDPROC format, must be included in the final report for each NGS horizontal control station and/or vertical control station used for this project.

The DDPROC program is available through the Lansing MDOT Design Survey office. The Consultant may opt to use the Mark Recovery Form on the NGS web site (www.ngs.noaa.gov). If this done, a printed copy must be submitted with the portfolio.

HORIZONTAL CONTROL

The consultant must establish the primary horizontal coordinate control base to be used for the project. The horizontal coordinate control base must be a project ground system based upon the Michigan State Plane Coordinate System (NAD83 MSRN CORS96). A combined scale factor must be computed and applied, and a coordinate shift must be applied to differentiate the project ground coordinates from the grid coordinates. **All horizontal measurements must be in the project ground coordinate system.** The consultant must establish additional intermediate horizontal control points, as needed, to the control base. All intermediate control established in this survey, must be established in compliance with the Michigan Department of Transportation (MDOT) Design Surveys *Standards of Practice* dated March, 2006.

The horizontal project control for this project will be classified as intermediate project control according to the MDOT *Standards of Practice* dated March 2006. These control points are intended for control, staking, and mapping and should be located outside the proposed construction area to insure their availability for all phases of construction. Each control point must be accurately described and witnessed to at least four nearby features. Please refer to MDOT's *Standards of Practice* for the minimum requirements for these points.

A closed traverse must be run and adjusted between two or more known points on the project control traverse. Open radial vectors and Real Time coordinates are NOT acceptable. Rapid/fast static procedures are acceptable. Unadjusted traverse measurements must produce an error of closure of not greater than 1:20,000. Any permissible error of closure shall be distributed throughout the traverse by means of a suitable least squares adjustment software program. These points must not be set greater than 1320 feet nor less than 450 feet apart, be semi-permanent in nature, and located outside the proposed construction area to insure their availability for all phases of construction. All data collection traverse points and the alignments must be tied to the control established for this project. Existing property controlling corners may be utilized as traverse points.

All property controlling corners and public land survey system corners, and interior subdivision block corners within the project limits shall be tied to the coordinate system for the project, and witnessed. This includes 1/16 corners, subdivision corners and existing alignment points. Lot corners do not require witnesses unless they are utilized as horizontal control points.

All field observations, unadjusted traverse computations and final adjusted coordinates must be included in the notes.

A list of all horizontal control points must be developed which includes Coordinate datum and zone, and contains all point designations, descriptions, coordinates (Y & X), elevation (Z), combined Scale Factor, station and offset, and witnesses for each component. This list must also provide a formula for a grid to ground conversion. This list must be generated in ASCII format, without tabs, as shown in Attachment A. A Microsoft Word file format, with tabs, is also

acceptable (for importation through the MicroStation-Axiom-Microsoft Office Importer), as long as it maintains the integrity of the form shown in Attachment A. This list must also be printed on 8.5" x 11" sheets and placed on the CD. All data relating to the horizontal component of the system must be included in the control section of the portfolio.

When using GPS techniques to obtain coordinates on either Primary or Intermediate Control points, two of the following methods must be used.

- A minimally constrained CORS solution
- An OPUS solution with at least 2 hours of occupation per point. For any and all OPUS solutions, a RINEX format file with a minimum of two hours of GPS data must be included, as well as the OPUS solution from NGS. All OPUS solutions must be verified within 0.20 foot, either by a separate OPUS position from an independent occupation, or by a NGS/CORS adjustment.
- The procedure outlined in Section 7.2.1 of the MDOT Survey Manual.

Unadjusted network vector measurements must produce an error of closure of not greater than 1:100,000 for primary control and 1:20,000 for intermediate control. Any permissible error of closure shall be distributed throughout the network by means of a suitable least squares adjustment software program. The difference in global location between the two chosen methods must not exceed 0.20 foot (0.0610m). A narrative explaining the process and errors must be included in the Surveyor's Report.

Use of RTK GPS mapping methods needs to be discussed with the Survey Project Manager prior to the beginning of any project.

VERTICAL CONTROL

The vertical component of this system must be based upon the North America Vertical Datum of 1988 (NAVD 88). The vertical least squares adjustment statistics must be reported at the 95% confidence level.

New project bench marks must be set on massive structures, at intervals of approximately 1500 feet and outside the proposed construction area. Each bench mark must be accurately described and its horizontal position referenced by station plus and offset from the alignment stationing.

Project bench marks are intermediate vertical control and shall meet an unadjusted error of closure between known bench marks of not more than 0.06 feet times the square root of the distance between the marks in miles (Third Order leveling accuracy standards). Any error of closure must be distributed throughout the level runs by means of a suitable least squares adjustment software program. Open level loops are NOT acceptable.

The bench mark notes must include all field observations, the unadjusted loop closures and the final adjusted elevations. A **bench mark list** must be developed that includes datum, bench mark designations, descriptions, elevations, and station and offset (left or right) out from the alignment stationing. This bench mark list must be printed on 8.5" x 11" sheets and placed on a CD, in ASCII format, without tabs, per Attachment ASC. All data relating to the vertical

component of the system must be included in the control section of the portfolio.

ALIGNMENT

A detailed explanation of how the alignment was established, along with all documentation, is required as part of the Surveyor's Report.

A legal alignment may need to be established for any project. Establishing the plan centerline alignment determines the legal limit of the right-of-way as defined by and described from its centerline. Right-of-way plans, previous construction plans, existing monumentation, physical centerline both present and underlying, physical evidence and other recorded information are to be used as guides to the **proper location of the legal centerline**. All evidence must be evaluated to determine the plan alignment. The method used to establish this alignment **must be clearly explained** in the surveyor's project report. All data used to determine the alignment, as well as a sketch of the alignment, must be included in the submitted survey portfolio. This alignment, with the stationing marked and labeled, is to be shown on the topographic map submitted for this project. The Consultant will use the existing Right-of-Way plans to set the stationing for this project. All measured angles, distances, and curve data must also be reported where applicable. All as-built centerline deflection angles, distances, and curve data must also be reported for this section of roadway, where as-built centerline differs from legal centerline. Alignments of all side streets must be tied to the project legal alignment.

At least two alignment control points must be found or set and witnessed on each tangent. These points must be intervisible and not be more than one half mile apart. The alignment points may be set on an offset to the true alignment. If this is done, the witnesses must include the offset distance and the project surveyor must certify that the line is a true parallel offset. The project surveyor must provide a sufficient number of primary and intermediate control points to allow staking of the computed alignment without additional traversing by construction survey crews. The alignment notes must include the state plane coordinates with the combined Scale Factor, and at least four witnesses for each alignment control point set or found. Alignments of all side streets must be tied to the project legal alignment.

The consultant must include a sketch or CADD drawing of the alignment in the portfolio, showing stationing, horizontal coordinates, curve data (Radius, External, Tangent length, PC station, PI station and PT station), alignment points found or set, and the basis from which the project stationing was determined.

All alignment points are to be filed on Land Corner Recordation Certificate (LCRC) forms at the appropriate county courthouse as Property Controlling Corners. Recorded copies of the LCRCs must be included in the portfolio.

A list of all P.I.'s, P.C.'s, and P.T.'s must be developed which includes datum and zone, and contains all point designations, descriptions, state plane coordinates (Y & X), combined Scale Factor, and witnesses for each component.

The Consultant must use the MDOT Feature Code of SCL for the alignment chains.

An as-constructed centerline alignment may need to be determined for any project. Sketches and all other documentation must be clearly labeled and refer to this alignment as "as-constructed."

The alignment must be annotated as in the following example: As-constructed alignment for CS 74073 as surveyed in 2006.

The Consultant is requested to match the right of way plan stationing as closely as possible, and to show and explain the source of stationing on the alignment sketch. A detailed explanation of how the alignment was established, along with all documentation, is required as part of the surveyor's report.

It is not required for the Consultant to stake the calculated alignment or to provide a witness list for the alignment points used for the calculated as-constructed alignment. However, any and all evidence of legal alignment PCs, PIs, and PTs must be noted, since those points are considered Property Controlling Corners. The location must be tied to the project coordinate system, and a Land Corner Recordation Certificate (LCRC) form filed at the appropriate county courthouse as Property Controlling Corners. Recorded copies of the LCRCs must be included in the portfolio.

A list of all legal alignment PCs, PIs, and PTs tied in must be developed which includes datum and zone, corner designation, descriptions, State Plane Coordinates (Y & X) coordinates, combined scale factor, and witnesses.

The Consultant must include a sketch or CADD drawing of the alignment in the portfolio, showing stationing, horizontal coordinates, curve data (radius, delta, tangent length, PC station, PI station, and PT station), alignment points found or set, and the source of stationing.

The as-constructed alignment must be shown on the CADD drawings produced for this survey, and in the CAiCE file.

The Consultant must use the MDOT feature code of SCL for the alignment chain.

PROPERTY

The property section is comprised of all government corners and property information required for this project. This includes all pertinent recorded land corner recordation certificates (LCRC), and ties to the project coordinate system for all found or set monumentation. It is the responsibility of the Professional Surveyor to safeguard all corners of the United States Public Land Survey System, Published Geodetic Control and any other Property Controlling corners that may be in danger of being destroyed by the proposed construction project.

GOVERNMENT CORNERS

All Public Land Survey System (PLSS) corners, property controlling corners, and interior subdivision block corners within the project construction limits must be recovered and tied to the project coordinate system and witnesses. This includes 1/16 corners and platted subdivision

corners. Lot corners do not require witnesses unless they are utilized as horizontal control points. Any PLSS corners needed to establish the alignment are required (if legal centerline is required), as are any PLSS corners in danger of obliteration by impending road construction, will meet all the same rules.

All PLSS corners must be verified to the Professional Surveyor's satisfaction and recorded in accordance with PA 74 of 1970, as amend, and all applicable administrative rules. A recorded copy of a recent LCRC may suffice, as long as four valid witnesses remain. The Consultant is specifically responsible for the recordation of a LCRC to perpetuate the evidence of any corners and all monument boxes located in the project area. A copy of each **recorded** LCRC must be submitted as part of the final report.

All PLSS corners located in hard surface roads must be protected by a monument box, regardless of any impending construction. It shall be the responsibility of the Project Surveyor to coordinate all such activities with the County Remonumentation Representative(s). Validating the corner locations through the applicable County Remonumentation Peer Group is optional but not required.

A **list of all government corners** used must be developed which includes header with 1983 State Plane Coordinate datum and zone, and contains all corner designations, descriptions, state plane coordinates (Y & X), combined Scale Factor, and witnesses for each component.

MAPPING

Project deliverables will included an Intergraph MicroStation V8 (.dgn) format 2D planimetric map for the area within the mapping limits in both hardcopy and electronic format, a corresponding three dimensional MicroStation V8 (.dgn) triangle file and Geopak (.ali), (.xyz), and (.obs) files along with a fully edited CAiCE archive (.zip) file. These files must be created with the current MDOT English seed and cell files. Current MDOT symbology must be used exclusively as shown on the MDOT FTP site.

The FTP site for consultants is:

<ftp://ftp.michtrans.net>

username: survcons

password: \$urvcon\$

Survey data must be displayed, with the appropriate descriptive attributes, MicroStation levels, size of text, etc. as noted on the FTP site. This information, if requested, can be given to the selected consultant.

Mapping Scale: AS NEEDED TO FACILITATE THE PROPOSED DESIGN

The Consultant is required to use the latest MDOT Tugboat (macro) to produce the final project deliverable.

The surveyor or CAiCE/CADD technician is expected to use due judgment in the event of necessary deviations from this standard. Survey chains (line items) will be processed and edited so as to be displayed as lines and smooth curves as appropriate, all gaps shall be closed, and displayed to scale with the appropriate pattern. All descriptive text shall be arranged such that the text shall not overwrite each other. The delivered product should be legible and professional in appearance and portray an accurate representation of existing field conditions. As there are many variations in standard practices throughout the industry, it is recommended that the consultant refer to the MDOT RFP site and the MDOT Design Division Plans Preparation Guidelines for additional information regarding such things as font size, display attributes, symbology, levels, etc. to be displayed in the submitted planimetric file. Questions or confusion should be immediately brought to the attention of the MDOT Project Manager for clarification.

Tree descriptions shall differentiate deciduous for coniferous and include trunk diameter, in inches, four feet above the ground; Culvert type, size in inches and flow line elevations; Brush and wooded areas should be outlined and classified as to average size and density as noted in the attached appendix. Additional information that should be noted is surface materials, changes in surface materials. Curb detail (profile type), ditch type (e.g. 2 ft round bottom), contours on the appropriate level and interval, building or mailbox addresses and other noteworthy items. This information may be included on the CADD file (on the proper level), or handwritten on a field verification plot. The plots will be submitted as described under the section of "Final Reports".

A Digital Terrain Model (DTM) will be created from the appropriate terrain data using the CAiCE terrain modeling format. It shall be checked for accuracy and edited as necessary to provide a true representation of the existing terrain. All triangles in the triangulation network that fall outside the limits of this survey, or are deemed inappropriate in the judgment of the surveyor, are to be obscured so as to have no affect on cross sections and profiles developed from the model. This would include triangles which have legs so long as to cross areas that contain no survey data. Contours are to be generated from the Digital Terrain Model (DTM), to depict the site conditions for this project and plotted as noted above.

It is imperative that DTM break lines do NOT cross. All DTM break line crossings must be resolved in CAiCE prior to the creation of the final DTM.

A statement, similar to the following, must be affixed to each sheet of all plots which certifies to the map's accuracy and signed and sealed by the project surveyor.

I hereby certify that this map has been developed from survey data collected, and that accuracy standards are in accordance with the MDOT Design Survey Standards. This map correctly represents the existing conditions at the time the survey was completed.

All plots must be clearly defined and legible. An illegible plot or files that cannot be read by MDOT will not be accepted.

DRAINAGE

The Consultant is responsible for all data necessary to determine the drainage for the project.

The Consultant is required to contact all local officials necessary to obtain all surface and subsurface drainage information regarding the project. All plans and maps obtained from local officials are to be submitted as part of the final report. The Consultant must ask the local officials and residents about any known drainage problems within the project area and report their findings, as well as any observed drainage problems.

The Consultant shall locate, measure and describe drainage structures for the project. This includes but is not limited to culverts, structures, ditches, inlets and outlets, and catch basins. At a minimum, the size, direction, composition, and invert elevations of all culverts or pipes shall be measured and recorded. If drainage piping has head walls or end sections, a description and the size shall be noted. The Consultant shall deliver the horizontal coordinates for all surface drainage structures, catch basins and culverts.

The following information is required for all surface and subsurface drainage:

- The point designation, type, size, location, station, offset, condition, invert and surface elevation of each drainage structure and culvert. This information must be printed on 8.5" x 11" sheets and submitted on a CD in ASCII or spreadsheet format.
- The location of all catch basins, manholes, sewers and cross culverts must be shown on the topographic map. It is a requirement to prepare a separate plot with each point labeled with its point designation to clearly show the surface and subsurface drainage systems. Underground sanitary and storm sewers must be mapped to show the connectivity of the structures. **The Consultant is required to show connectivity of these systems.** The MDOT project manager may allow the topographic map to satisfy this requirement.
- Descriptions of underground drainage structures should include: description and type of structure, type of system (storm, sanitary, etc.), description of type of structure cover, size, type, invert elevation and direction of each pipe leading into or out of the structure.
- Culvert descriptions must include: size, type, invert elevation and end section treatment. Conditions of the culverts should include: horizontal and vertical misalignment, visible damage, rust, infiltration and amount by which it is filled with dirt and debris, if any.
- The location of any drainage problems affecting the mapping area must be shown on the topographic map.
- Photographs must be submitted for each culvert, labeled by station and offset. Digital photographs are preferred, and may be submitted electronically only.

This section will contain sections for all topography, elevations, surface/subsurface utility locations, and surface/subsurface drainage including all cross culverts.

UTILITIES

All surface manifestation of utilities within the project area must be identified and their location tied to the project's horizontal coordinate system. A **list of all utilities** within the project limits must be submitted on CD as well as on a printed list. This list must include the feature name of each utility, its horizontal coordinates and elevation, and station and offset. A CAiCE station offset report will satisfy this requirement.

MISCELLANEOUS

Any information that would not be appropriately placed in the control, property, or mapping sections should be included in this section. General photographs, local newspaper articles and project-related comments from residents are examples of miscellaneous data.

The surveyor must describe in the final report, the data included in this section.

ATTACHMENT A

MDOT REQUEST FOR CONSULTANT SURVEY SERVICES

February 28, 2007

Consultant Company
Attn: Project Manager, P.S.
Street Address
City, MI zip code

MDOT requests Consultant survey services for the following project under the contract authorization number 2007-#### (#), Scope of Services for Design Survey Services As Needed for Bay Region 2007.

JOB NUMBER: XXXXXC

CONTROL SECTION: XXXXX

ROUTE: US-131 from 500 feet south of M-11 to 500 feet north of Wealthy St., City of Grand Rapids, Kent County.

TYPE OF SURVEY: Road Design Survey, P/PMS Task 3330

DUE DATE: 6 WEEKS after final work authorization is issued.

PROJECT DESCRIPTION:

Perform standard MDOT Road Design Survey (P/PMS Task 3330) throughout the above project limits. This project will require full topographic mapping, including lane lines and centerlines, from 10 feet outside the back of curb on either side from 500 feet south of M-11 to 500 feet north of Wealthy St. Full topographical mapping will also be required for all crossroads between the ramp terminals. If the ramp terminal for the crossroad is not on a structure then an additional 200 feet either side of the ramp terminal is required. Full topographical mapping is required on all ramps at Burton St., Hall St., and Franklin St. Utility locations are required throughout the above project limits with pipe inventory and inverts needed on drainage structures. Obtain locations on all signs, signal loops, poles, hand holes, and traffic related items throughout the project limits. This project will require legal alignment and existing plan/construction alignments for US-131, NB and SB, ramps, and crossroads throughout the above project limits.

PROJECT DELIVERABLES:

Standard MDOT survey portfolio with administrative, control, alignment, mapping, property, and miscellaneous information per MDOT's Standards of Practice dated March 2006 and the MDOT Design Survey Manual, for the above referenced project. The deliverables are requested as MicroStation version 8 files (MDOT 2005 Codelist) to be built with the latest MDOT Tugboat. Horizontal and vertical control least squares error analysis is to be reported at the 95% confidence interval (2-sigma). The attached MDOT QA/QC checklist is to be used with this project.

Receipt of this request requires the Consultant to notify the undersigned regarding the availability of the consultant's staff to work on this project in writing within two working days. A signature below indicates that the Consultant agrees to the terms and conditions detailed in the original Scope of Services for Design Survey Services As Needed for the Bay Region 2007 and this Request for Consultant Survey Services letter including the project due date. A detailed cost proposal with a breakdown of man hours and tasks will be submitted and reviewed prior to obtaining a final work authorization.

Barbara H. Snyder, PS
MDOT Bay Region Surveyor
FAX: 989.754.8122

Project Manager, PS
Title, Firm, date

ATTACHMENT ASC

Mandatory ASCII format for control point, alignment point, government corner witness lists, and benchmark list.

1. File must be generated exclusively in ASCII Text format, in a program such as Notepad. Conversions from Rich Text Format, WordPerfect, etc. are not acceptable unless the file can be imported directly into MicroStation in proper format.
2. **Do not use Tabs** to align text. Use spaces only.
3. Use normal keyboard keys for fractions. (Example: 1/2)
4. For special characters use only the following MDOT Design Font Zero keyboard keys.

FONT O KEY BOARD CHANGES

< = ±	(PLUS OR MINUS)
\ = ¢	(CENTERLINE)
} = Δ	(DELTA)
! = ø	(DIAMETER)
^ = °	(DEGREE)

5. Data must be organized as shown in the example below:

CONTROL PT#: CP660

DESCRIPTION: Set 5/8" x 3' rerod and yellow S&W cap in west edge of M-95 gravel shoulder, and < 150' north of \ of Norway Dr.

Station 47+38.27, Offset 24.00'Lt

COORDINATES: N = 409,047.6476 E = 13,232,571.566 Elev = 892.864

Combined Scale Factor: 0.99996741

WITNESSES:

1. EAST 16.45' \ of N-S concrete M-95.
 2. SOUTH 6.05' North edge of concrete base of "Sagola City Limits" sign.
 3. S84^W 16.66' Set nail and S&W tag in north face of power pole.
 4. S43^E 73.82' Set nail and S&W tag in S.W. face of 6" ! maple.
6. Data must be capable of being imported directly into MicroStation, while retaining basic structure and showing proper symbols such as degree and centerline.
 7. Prior to importing text files into MicroStation, the font must be set to 0, Height must be set to 12, Width must be set to 10, and Line Spacing must be set 8 in the MicroStation-Element-Text Dialog Box. Also, in the same Dialog Box, single line and multi-line justification must be set to Left.

8. A MicroStation file must be saved and submitted with the appropriate control point, benchmark and witness data. This file must be named Job#wit.dgn. An example is available on the MDOT FTP site.